INSTALLATION ACTION PLAN
FOR
BADGER ARMY
AMMUNITION PLANT

August 2004

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Badger Army Ammo Plant

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FY 2005

as of

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Statement of Purpose

The purpose of the Installation Action Plan (IAP) is to outline the total multi-year restoration program for an installation. The plan will define Installation Restoration Program (IRP) requirements and propose a comprehensive approach and associated costs to conduct future investigations and remedial actions at each Operable Unit (OU) at the installation and other areas of concern.

In an effort to coordinate planning information between the IRP manager, Army Environmental Center (AEC), installations, executing agencies, regulatory agencies, and the public, an IAP has been completed for the Badger Army Ammunition Plant (BAAP). The IAP is used to track requirements, schedules and tentative budgets for all major Army installation restoration programs.

All site-specific funding and schedule information has been prepared according to projected overall Army funding levels

The following agencis contributed to the formulation and completion of this Installation Action Plan:

Badger Army Ammunition Plant
BRAC Technical Office
Citizens for Safe Water Around Badger
Engineering & Environment, Inc.
Eykholt Consulting
Geo Sierra
Ho-Chunk Nation
Olin Corp.
Stone & Webster
Wisconsin Dept. of Natural Resources
U. S. Army Corps of Engineers - Omaha
U.S. Army Environmental Center

Acronyms & Abbreviations

AEC	Army Environmental Center
AEDB-CC	Army Environmental Data Base - Compliance
AEDB-R	Army Environmental Data Base-Restoration
AST	Aboveground Storage Tank
ATSDR	Agency for Toxic Substances & Disease Registry
BAAP	Badger Army Ammunition Plant
BIG	Badger Intergovernmental Group
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
DERA	Defense Environmental Restoration Account
DERP/MIS	Defense Environmental Restoration Program/Management Information System
DNT	2,4 Dinitrotoluene
DRMO	Defense Reutilization and Marketing Office
DRMS	Defense Reutilization and Marketing Service
DSERTS	Defense Site Environmental Restoration Tracking System
EPA	Environmental Protection Agency
ER,A	Environmental Restoration, Army (formally called DERA)
EPIC	Environmental Photographic Interpretation Center
FFA	Federal Facilities Agreement
FFSRA	Federal Facility Site Remediation Agreement
FS	Feasibility Study
FY	Fiscal Year
GOCO	Government Owned Contractor Operated
GOGO	Government Owned Government Operated
gpm	gallons per minute
IAG	Interagency Agreement
IAP	Installation Action Plan
IRA	Interim Remedial Action
IRP	Installation Restoration Program
K	Thousand
LTM	Long Term Monitoring
M	Million
MCL	Maximum Contaminant Level
NC	Nitrocellulose
NE	Not Evaluated
NFA	No Further Action
NG	Nitroglycerine
NPL	National Priority List
OB/OD	Open Burn/Open Detonation
OU	Operable Unit
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
POL	Petroleum, Oil & Lubricants
PP	Proposed Plan
ppb	parts per billion
RA	Remedial Action

Acronyms & Abbreviations

RA(C)	Remedial Action - Construction
RA(O)	Remedial Action - Operation
RAB	Restoration Advisory Board
RBC	Risk Based Concentrations
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
REM	Removal
RI	Remedial Investigation
RIP	Remedy in Place
ROD	Record of Decision
RRSE	Relative Risk Site Evaluation
SI	Site Inspection
SOC	Statement of Condition
SOP	Standard Operating Procedures
STP	Sewage Treatment Plant
SWMU	Solid Waste Management Uniit
SVOC	Semi-Volatile Organic Compounds
TCE	Trichloroethylene
TPHC	Total Petroleum Hydrocarbons
TCLP	Toxicity Characteristic Leaching Procedure
TRC	Technical Review Committee
Ug/g	microgram per gallon
Ug/l	microgram per liter
USACHPPM	United States Army Center for Health Promotion and Preventive Medicine
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Center
USAEHA	United States Army Environmental Hygiene Agency (replaced by CHPPM)
USATHAMA	United States Army Toxic and Hazardous Material Agency (replaced by AEC)
UST	Underground Storage Tank
UXO	Unexploded Ordnance
VOC	Volatile Organic Compounds
WDNR	Wisconsin Department of Natural Resources

Summary

STATUS

Non-NPL, RCRA permitted. Confirmed off-post groundwater contamination

NUMBER OF AEDB-R SITES:

35 AEDB-R sites
- 8Active ER,A Sites
- 2 Remedy in Place (RIP) with LTM or RA(O)
- 29 Response Complete under ER,A

DIFFERENT AEDB-R SITE TYPES:

6	Pond & Ditch Areas	5	Closed Landfill
4	Material Storage Areas	10	Production Areas
5	Burning Areas	4	Tank Areas
1	Off-Site Groundwater Plume		

CONTAMINANTS OF CONCERN:

Carbon Tetrachloride, Trichloroethlene, Chloroform, Dinitrotolulene, Lead, Mercury, Nitroglycerine.

MEDIA OF CONCERN:

Groundwater, Soil, Sediments

COMPLETED REM/IRA/RA:

RA - FY89 Existing Landfill closed & capped (BAAP-004)
IRA - FY88-89 PBG GW Treatment Plant construction (BAAP-33)
RA - FY91 Alternate water supply to two residents (BAAP-012)
IRA - FY95 Soil removal/cover at PBG racetrack (BAAP-34)
IRA - FY96 Modified GW Treatment Plant construction (BAAP-33)
IRA - FY96 NG Pond berm construction (BAAP-005)
RA - FY96 PCB soil at Transformer Yard removed (BAAP-38)
RA - FY97 Replacement of third residential well (BAAP-012)
RA - FY97 Landfill 1 capped (BAAP-35)
IRA - FY98 SVE installed at PBG Waste Pits (BAAP-33)
IRA - FY98 Bioventing installed at Powerhouse spill site (BAAP-37)
RA - FY98 1949 Pit Capped (BAAP-35)
RA – FY99 East & West Rocket Ditches soils removed (BAAP-36)
RA – FY99 Nitroglycerine Pond soil removed & disposed (BAAP-005)
IRA – FY2000 PBG and DBG soil removed & disposed (BAAP-006,33)
RA - FY2002 Grabers Grove Bay dredged (BAAP-40)
RA - FY2003 DEBC capped (BAAP-006)

CURRENT IRP PHASES:

RI/FS at 1 site	RD at 1 site	
RA at 4 sites	RA(O) at 2 sites	LTM at 2 sites

PROJECTED IRP PHASES:

RD at 1 site	RA at 2 sites	RA(O) at 2 sites
LTM at 2 sites		

IDENTIFIED POSSIBLE REM/IRA/RA:

BAAP-001, 006, 009, 033, 040, 042

DURATION:

ER,A Started at Badger AAP:	1977
Expected RIP at Badger AAP:	2010
Expected RC ar Badger AAP:	2032+

Installation Information

SITE DESCRIPTION:

Badger Army Ammunition Plant (Badger) is located on 7,354 acres of land in Sauk County, Wisconsin. It is bordered on the north by Devil's Lake State Park, on the east by farmland, State Highway 78, and the Wisconsin River, on the south by farmland, and on the west by U.S. Highway 12. Badger is approximately 9 miles south of Baraboo (pop. 10,000), and 5 miles north of Sauk City/Prairie du Sac (pop. 3,000). A small retirement community with approximately 300 residents is located directly west across Highway 12 from Badger's main gate. On Badger's east side, between Highway 78 and the Wisconsin River, are several unincorporated residential developments with a projected population of 1,000 people when fully developed.

COMMAND ORGANIZATION:

Army Environmental Center North-East Region
DIRECTORATE: Base Realignment and Closure, Hampton Field Office

IRP EXECUTING AGENCIES:

INVESTIGATION PHASE: U.S Army Environmental Center, Installation Restoration Division, Branch A.
ACTION PHASE: U.S Army Corps of Engineers, Omaha District, Olin Corporation, Shaw E & I and SpecPro, Inc.

REGULATORY PARTICIPATION:

FEDERAL: U.S. Environmental Protection Agency, Region V
STATE: Wisconsin Department of Natural Resources and Wisconsin Division of Health

REGULATORY STATUS:

Non-NPL with confirmed off-post contamination
RCRA Part B permit issued 1988, modified in January 1996, renewed 1998
Corrective actions underway in accordance with State Order (In-Field Conditions Report) last modified December 2000

Installation Description

Badger was constructed in 1942 in Sauk County, Wisconsin, near the city of Baraboo. The plant was operated intermittently over a 33-year period to produce single- and double-base propellant for cannon, rocket, and small arms ammunition. Plant operation was terminated in March 1975 and all production facilities and many support functions were placed on standby status, which continued until 1998, when the Army declared Badger excess to its needs. The 7,354 acre facility is being prepared for a change in ownership. The proposed new owners are the Department of Agriculture, the Bureau of Indian Affairs for the Ho-Chunk Nation, and the Wisconsin Department of Natural Resources.

Contamination Assessment

Badger Army Ammunition Plant was built on farmland composed of up to 10 ft of clay silt (loess) topsoil over very permeable sand and gravel deposits.

Studies conducted during the late 1970s and early 1980s discovered that materials such as propellant grains, dinitrotoluenes (DNTs), organic solvents, and acids had been released during production. Some contamination of surface soils and groundwater were found or suspected. A preliminary investigation and site assessment was conducted in 1987 and documented in the Master Environmental Plan for Badger AAP. Some volatile contaminants in the soil, such as the solvent carbon tetrachloride, had been carried by infiltrating precipitation down through the soil to the groundwater that is 90 to 110 feet below ground surface. The contaminants then moved with the groundwater, which generally flows to the south. Some contaminants, such as dinitrotoluene (DNT, a burn rate modifier for propellants), are not as mobile and move slowly through the soil. Other non-mobile contaminants, such as lead, remain where they were deposited. Thus there are areas with contamination only in the top layers of soil, areas with soil contaminated from the top to varying depths or to the groundwater, and areas where the only problem is the contaminated groundwater moving through the subsurface soils. There are also ponds where pond water and bottom sediments have been affected by contaminants that were carried there in process discharge water.

Based on information developed during this preliminary assessment, the Wisconsin Department of Natural Resources (WDNR), issued an In-Field Conditions Report (IFCR) for Badger in September 1987. The IFCR contained requirements to conduct a Remedial Investigation/Feasibility Study (RI/FS). The IFCR has been modified by the state as necessary over the years to keep it current and address the latest findings and decisions regarding the installation cleanup program.

In 1988, the installation received a Hazardous Waste Operations License in accordance with the Resource Conservation and Recovery Act (RCRA) Part B permit process. Issued jointly by the U.S. Environmental Protection Agency (EPA) Region V and the WDNR, it included specific requirements for an investigation at each of the potentially contaminated sites previously identified. It also provided for a phased study program based on a prioritized ranking. This was renewed in 1998.

Badger was nominated for the National Priority List (NPL) but was not listed. The remediation program is proceeding under the RCRA authority of the state and the EPA, but the terminology and investigative procedures follow CERCLA. There is joint oversight of the remedial efforts by EPA and WDNR, with WDNR taking the lead role.

The Remedial Investigation (RI) began at Badger in 1988. A plume of contaminated groundwater was discovered at the Propellant Burning Ground that appeared to be moving toward the installation boundary. To prevent the plume from moving off-site, an interim groundwater extraction, treatment, and discharge system was constructed. It began operating in May 1990.

In April 1993, the RI was completed for Badger. It identified the types, concentrations, and locations of contamination at the installation. The Feasibility Study (FS), completed in August 1994, looked at the possible ways to treat the contamination identified in the RI and recommended remedies for each site. The regulators agreed with the Army's recommendations for remedies. These have been incorporated into the In-Field Conditions Report modifications of June 1995 and the RCRA permit modification of January 6, 1996.

Other investigations after the RI/FS were completed revealed two additional sites where remedial work was required. One of these sites has been remediated; the other is in the construction phase.

Remedial design work began upon completion of the FS. Based on further investigations, the Army has developed new estimates of the extent of contamination and probabilities of success for the selected remedies for some sites. As a result, the Army received approval for changing the cleanup methods at the Nitroglycerine Pond, Rocket Paste Area, and East & West Rocket Ditches in FY98. In 2002, the Army received approval for changine the remedy at the Deterent Burning Ground. A cap and insitu biotreatment system was installed in 2003.

Contamination Assessment

The draft final Phase I RI report (January 1990) indicated that two plumes of contamination have migrated beyond BAAP boundaries. From the Propellant Burning Ground area, a plume of volatile organic compounds (VOCs), with carbon tetrachloride as the primary contaminant, has moved past the southern boundary. Concentrations of carbon tetrachloride at the southern boundary are as great as 210 parts per billion (ppb). From the Deterrent Burning Ground/Existing Landfill area, a sulfate plume has been detected past the eastern boundary. Concentrations of SO4 at the eastern boundary are as great as 640 ppm but concentrations in private wells outside the boundary are below the state preventive action level of 150 parts per million (ppm). Maximum regulatory levels are five ppb for carbon tetrachloride and 250 ppm for sulfate.

An off-post groundwater monitoring program was initiated in January 1990. In late April 1990, results of monitoring residential supply wells south of Badger showed that three private potable water wells had been contaminated with carbon tetrachloride and chloroform at levels as high as 80 ppb and 9.9 ppb, respectively. The locations of these wells confirm the expected groundwater movement from the modeling conducted as part of the Phase I RI. The VOC plume is flowing south from the Propellant Burning Ground Waste Pits, past the installation's southern boundary, then easterly to the Wisconsin River below the Wisconsin Power and Light dam. Two replacement wells were installed in December 1990 as a remedial measure. The third residence finalized their agreement with the Army in 1995, and the well replacement was completed in 1996. Prior to this, bottled water was provided. In the northeast area, private wells are being monitored and at this time do not show contamination attributable to Army sources.

The RI/FS effort was halted in September 1990 by USATHAMA due to laboratory fraud. The work resumed in 1991. A draft final RI Report was submitted to the regulatory agencies in December 1992 and the final report was issued in April 1993. Of the 12 sites studied, six were recommended for no further action, and six for further study.

A draft final Feasibility Study was issued to the regulators for review in July 1993. This draft required several modifications due to Wisconsin's adopting new rules for site cleanups. The revised FS was published in August 1994, and accepted by the regulators and the public as final in 1995. The regulatory approvals, conditions and timeframes are contained in the In-Field Conditions Report from the state, modified 6/95, and in the RCRA permit modification issued jointly by the state and EPA on January 6, 1996.

As each site has been more thoroughly investigated and better characterized since 1996, our understanding of site conditions has improved. Site specific reme3dies are being proposed that will will fully protect human health and the environment.

Additional investigations are being performed in the production areas of the installation. These were not addressed in the original investigations in the the early 1990s. As problems are identified, new sites will be added to the ER,A program.

PREVIOUS STUDIES

Title	Author	Date
Phase 2 Hazardous Waste Management Study, Propellant Burning Ground	U.S. Army Environmental Hygiene Agency (USAEHA),	
Geological and Soils Survey and Groundwater Monitoring Program	Warzyn	
Engineering Report Groundwater Monitoring Wells Synthetic Acid Plant Badger AAP	Sarko	
Establishment of Five Groundwater Monitoring Wells, Physical Analysis of Soil Samples, and Chemical analysis of Groundwater Samples	Sarko	
Near-Surface Soils Investigations at BAAP	Ayres	
Phase 4 Hazardous Waste Management Study	USAEHA,Daubel	
Interim Report Geohydrologic Study No. 38-26-0504-86, BAAP	USAEHA	
Investigation Report for the Soil Sampling, Analysis, and Evaluation of the Settling Ponds Spoils Site at BAAP	Foth & Van Dyke	
Subsurface Investigation, BAAP	Warzyn	
U.S. Army Materiel Command (USAMC), Explosive Reactivity Testing Program BAA	Daubel	
USACE, Waterways Experiment Station Geophysical Investigation, Existing Landfill, BAAP	Whitten and Sjostrom	
Argonne National Laboratory, Master Environmental Plan for Badger Army Ammunition Plant	Tsai et al	
U.S. Army Environmental Center (USAEC), April 1993, Final Remedial Investigation Report, Badger Army Ammunition Plant	ABB Environmental Services	
Badger Army Ammunition Plant, Contamination Survey	U.S. Army Toxic and Hazardous Materials Agency (USATHAMA)	March-81
Draft Final Off-Post Contingency Plan	ABB Environmental Services	August-93
Draft Final Decision Document, Badger Army Ammunition Plant	ABB Environmental Services	September-93
USAEHA Hazardous Waste Study No. 37-26-J1QU-93, PCB Spill Survey	USAEHA, Aberdeen Proving Ground	September-93
Specifications and Drawings for Construction of Interim Remedial Measures Modification	Woodward-Clyde	1994
Final Feasibility Study	ABB Environmental Services	August-94
USACE, 1995, Final Treatability Study Work Plan - Predesign Activities for the NG Pond and Rocket Areas	RUST Environment and Infrastructure	April-95
USACE, 1995, Final (90%) Remedial Design for the Nitroglycerine Pond and Rocket Areas	RUST Environment and Infrastructure	November-95
Final Documentation Report for Soil Cover Construction, Racetrack and Thermal Treatment Unit Closure	Olin Corporation	October-96
Final Documentation of Construction and Completion of Modified IRM	Omaha District COE and Sverdrup	May-97
Northeast Boundary Area Groundwater Study	MSA Professional Services	July-97
Schedule Revisions – Notification of Intent to Request Changes in Remedial Actions Proposed for the Badger Army Ammunition Plant		September-97

PREVIOUS STUDIES

Title	Author	Date
RCRA Part B Permit Application, Feasibility and Plan of Operation Report for a Small Storage Facility at Badger Army Ammunition Plant	Olin Corporation	September-97
Position Paper and Ecological Risk Assessment No 39-EJ-1410-96	USACHPPM	November-97
Deterrent Burning Ground Subsurface Investigation	Stone & Webster, In c	December-97
Landfill #1 Cap construction, Propellant Burning Grounds, Final Construction Report	Olin Corporation	January-98
Powerhouse Biovent Design Report	Vierbicher Associates, Inc	January-98
Proposal to Modify Preferred Remedial Alternative for Nitroglycerine Ponds, Rocket Paste Pond, and East & West Rocket Ditches Areas, Badger Army Ammunition Plant		January-98 & March-98
A Review of Cancer Mortality and Incidence for Communities Near the Badger Army Ammunition Plant	Wisconsin Devision of Health	March-98
1949 Pit Cap Design, Propellant Burning Ground, 95% Design Report	Olin Corporation	March-98
Alternate Feasibility Study for Soil, Sediment, and Surface Water at the Nitroglycerine, Rocket Paste and Overflow Ponds	Stone & Webster, Inc	April-98
Draft Remedial Action Plan, Rocket Ditches Area	Olin Corporation	May-98
Badger Army Ammunition Plant Groundwater Hydrology Report	Olin Corporation	June-98
Waste Piles Disposal	Olin Corporation	June-98
Alternative Feasibility Study (FS) for the Deterrent Burning Ground and Propellant Burning Ground Waste Pits Subsurface Soil	Stone & Webster, Inc	July-98
Phase 11 Landfill Construction Specifications and Final Construction Quality Control Plan	Stone & Webster, Inc	July-98
Study Report, IRM Bromodichloromethane	Olin Corporation	July-98
Preliminary Investigation Report for the Oleum Landfill	Olin Corporation	August-98
1949 Pit Phase One Cap Construction, Quality Control and Quality Assurance Report	Olin Corporation	August-98
Final Remedial Action Plan, Rocket Ditches Area	Olin Corporation	August-98
Underground Storage Tank Removal and Closure Documentation	Olin Corporation	August-98
Draft Addendum Field Sampling Report, Propellant Burning Ground Subsurface Investigation, Soil Vapor Extraction System	Stone & Webster, Inc	October-98
Draft Field Sampling Report, Deterrent Burning Ground Subsurface Investigation		October-98
1949 Pit Phase One Cap, Final Construction Report	Olin Corporation	January-99
Draft Comprehensive Work Plan, Groundwater Technology Review and Natural Attenuation Screening Study, Propellant Burning Ground	Stone & Webster, Inc	January-99
Corrective Measures Implementation Report, Rocket Ditches Area	Olin Corporation	January-99

PREVIOUS STUDIES

Title	Author	Date
Corrective Measures Implementation Report, Nitroglycerine, Overflow, and Rocket Paste Ponds	Stone & Webster, Inc	January-99
1949 Pit Phase One Cap Final Construction Report	Olin Corporation	January-99
Corrective Measures Implementation Report Rocket Ditches Area Olin Corporation	Olin Corporation	January-99
Corrective Measures Implementation Report Nitroglycerine, Overflow and Rocket Paste Ponds	Stone & Webster, Inc	January-99
Environmental Baseline Survey	Plexus Scientific Corporation	January-99
Public Health Assessment for Badger Army Ammunition Plant	U.S Department of Health & Human Services	May-99
Independent Technical Review Final Recommendations Report	U. S. Army Environmental Center	May-99
Draft Comprehensive Field Sampling Plan Gruber's Grove Bay Investigation	Stone & Webster, Inc	January-00
Technical Memorandum Groundwater Flow Model PBG	Stone & Webster, Inc	March-00
Propellant Burning Ground Full Scale Bioremediation System Submittal	Stone & Webster, Inc	May-00
Summary Report Soil Vapor Survey Northwest of PBG	BT2, Inc	June-00
Proposed Dredging Gruber's Grove Bay	Stone & Webster, Inc	July-00
Draft Developing Site Specific Soil Cleanup Standards	Stone & Webster, Inc	September-00

BADGER ARMY AMMO PLANT

ER,A ACTIVE SITES

BAAP-001
SETTLING PONDS & DISPOSAL AREAS

SITE DESCRIPTION

The Settling Ponds are located along the installation's southern boundary and were first used in 1942. During the years of production, these man-made ponds received sanitary and industrial wastewater from the entire facility and surface runoff from the Nitroglycerine, Rocket Paste, and Magazine areas. Spoils removed during dredging operations were placed alongside the ponds. In-situ soil stabilization/ solidification and soil cover was the proposed remedial method in the 1994 FS. The currently impacted pond area is 67 acres and the spoils disposal areas are 21 acres. Soil sampling data, received in 2000 and submitted to the WDNR in a comprehensive analysis in the form of a Data Report in May of 2001, indicates dinitrotoluene (DNT) is present throughout the site, not in localized areas as was previously indicated. Nitroglycerine and mercury are present in isolated areas, primarily Spoils Site 1.

STATUS

RRSE RATING:
High Risk
CONTAMINANTS OF CONCERN:
Explosives, Metals
MEDIA OF CONCERN:
Soil, groundwater
COMPLETED IRP PHASE:
PA/SI
CURRENT IRP PHASE:
RIFS, RA, IRA
FUTURE IRP PHASE:
RA, LTM

A site-specific soil cleanup standards proposal has been developed and was submitted to the WDNR for review and approval in May 2002. The proposal was developed in accordance with Wisconsin Department of Natural Resources Chapter NR 700. Specifically, the proposal was developed following the guidance detailed in NR 720.19, which, among other things, recommends that the site-specific standards process be followed.

A follow-on Remedial Investigation was conducted in 2003 to determine the condition of the soil in production areas across the installation. Additional sampling is underway to complete the remedial investigation. A field study is being conduted to quantify the degredation of dinitrotoluene in the vadose (unsaturated) soil under the Settling Ponds.

Army conducted a preliminary groundwater investigation in Spring 2004 to characterize groundwater conditions. Army is currently monitoring wells to determine if DNT is moving in groundwater from this area toward off-site residences.

PROPOSED PLAN

A FS will be completed to considered and evaluated cost-effective remedial alternatives. Note: however, that the development of new site-specific standards, currently in the proposal stage, will likely affect the proposed remedy and its associated cost.

The current budgeted action is soil cover over ~90 acres and excavation of Spoils Site 1.

Additional monitoring wells will be installed on and off-site.

Groundwater monitoring is tracked at BAAP-012 and cap and cover maintenance is tracked at BAAP-035.

BAAP-006
DETERRENT BURNING GROUND

SITE DESCRIPTION

The Deterrent Burning Ground was used as a demolition debris landfill and for the open burning of deterrents, structural timbers, asphalt shingles, cardboard, papers, and office waste. Deterrent is an organic liquid containing dibutyl phthalate and dinitrotoluene used to modify the burning characteristics of nitrocellulose. This two acre site existed as a borrow pit from the 1940s until the early 1960s. Deterrent was burned in this area only after mobilization for the Vietnam conflict, specifically 1972 - 1975. Aerial photographs show the area closed and covered by 1978.

Investigations (starting in 1996) show the DNT has spread laterally in the subsurface soils and has reached groundwater. The estimated volume of contaminated soil has increased tenfold. The remedy in the 1994 FS called for soil removal and soil washing, but treatability studies have shown that soil washing will not work for the explosive compound (dinitrotoluene) in these soils.

STATUS

RRSE RATING:
High Risk
CONTAMINANTS OF CONCERN:
Explosives, Chlorinated VOCs
MEDIA OF CONCERN:
Soil, Groundwater
COMPLETED IRP PHASE:
PA/SI, RI/FS, RD, IRA, RA
CURRENT IRP PHASE:
RA(O)
FUTURE IRP PHASE:
RA(O)

In 1999 and 2000 the top 15 ft of soil in the pits was removed and disposed of off-site. This removed the surface soil contaminated with the highest DNT levels and metals. In 2001, the backfilled area was temporarily capped, and additional soil and groundwater studies were started to better understand the groundwater flow in the area.

Additional study of the area confirmed previous investigation results. On May 6, 2002, following submittal of a Revised Alternative FS, Army requested a permit modification to perform the RA, including partial excavation and incineration (completed in 2000), RCRA cap/cover, passive bioremediation, institutional controls and groundwater monitoring. The final remedy was approved by WDNR and was installed in 2003. The remedy, a passive biotreatment system (nutrient infiltration) under a RCRA cap/cover, began operation in the fall of 2003.

PROPOSED PLAN

Quarterly infiltration events will occur, along with soil respiration monitoring. The effectiveness of the remedy will be reviewed in 2008 and every 5 years thereafter.

Groundwater monitoring is tracked at BAAP-012 and cap and cover maintenance is tracked at BAAP-035.

BAAP-009
OLD ACID AREA

SITE DESCRIPTION

The Old Acid Area is located in the northwestern area of Badger. Nitric and sulfuric acid manufacturing and handling activities occurred in this area. Spills, leaks, and tank overflows would be expected to contribute nitrate and sulfate to the groundwater, as well as metals (i.e. iron) dissolved from the soil, pipes, and tanks.

Most production buildings were demolished in 2004. Soil sampling after demolition detected lead and arsenic. A soil and vegetative cover is being installed to prevent futivite dust releases.

PROPOSED PLAN

Further investigation to delineate the extent is planned. Soil removal, stabilization and on-site landfilling is proposed.

STATUS

RRSE RATING:
Low Risk
CONTAMINANTS OF CONCERN:
Sulfates, Nitrates, Iron, Lead, Arsenic
MEDIA OF CONCERN:
Soil
COMPLETED IRP PHASE:
PA/SI, RI
CURRENT IRP PHASE:
RD, RAC

BAAP-012
OFF-POST GW CONTAMINATION

SITE DESCRIPTION

There are two off-post areas of concern. One is located south of Badger, in an area that extends from the installation's southern boundary to the Wisconsin River just below the Wisconsin Power and Light Dam. A groundwater extraction system along the southern boundary prevents further migration (BAAP-033) of the groundwater from the Propellant Burning Ground. The other area is located north-east of Badger near Landfill #5 (BAAP-004) and the Deterrent Burning Ground (DBG, BAAP-006). Capping of the DBG in 2003 should reduce off-post concerns in the northeast.

Three residential water supply wells in the southern off-post area were definitely affected by the organic solvent contamination of groundwater in the Propellant Burning Ground. The affected residences have had their wells extended into the lower, uncontaminated aquifer.

STATUS

RRSE RATING:
HIgh Risk
CONTAMINANTS OF CONCERN:
Chlorinated Solvents, DNT
MEDIA OF CONCERN:
Groundwater
COMPLETED IRP PHASE:
PA/SI, RI/FS, RA
CURRENT IRP PHASE:
RIP with LTM
FUTURE IRP PHASE:
RIP with LTM

A Draft Final Off-Post Contingency Plan, dated August 1993, has been prepared to address potential threats to local groundwater drinking water supplies as a result of BAAP-related sources. The actions dictated by the plan are dependent on results from the on-going groundwater monitoring program. The installation-wide monitoring program incorporates both monitoring wells on and off the installation, and private residences outside the installation boundaries.

Detections of DNT in 2004 at the southern boundary, and in four of the off-site residenial wells, may require replacement of the residential wells affected. Additional monitoring well construction and sampling of off-site residential wells continues to determine the source of the contamination.

PROPOSED PLAN

Installation-wide and off-site groundwater monitoring is funded under this site.

Lease fees for off-site monitoring wells are paid annually to the landowners.

Construct new wells and complete groundwater flow studies as part of RI/FS at BAAP-001.

BAAP-033
PROPELLANT BURNING GROUND & CONTAMINATED PITS

SITE DESCRIPTION

The Propellant Burning Ground (PBG) Waste Pits are located in the southwestern portion of Badger AAP. The contaminated waste pits area is approximately 3 acres in size and contains three disposal pits and a large open area used to burn propellant-contaminated materials and organic solvents from the 1950s through the 1970s. The liquid waste materials migrated down through the sandy soil to the groundwater. A groundwater plume containing solvents and DNT has moved south past the installation's boundary.

Soil remedies originally selected in 1994 included soil vapor extraction, then soil removal, washing, and composting. However, the soil washing was shown to be ineffective in bench scale testing in 1997. An SVE system to remove solvents was installed in February 1998 and operated successfully until September 1999 when it was shut down to allow for excavation and installation of the biotreatment system. Shallow soils contaminated with DNT and metals were removed from the waste pits in the fall of 1999 and a pilot biotreatment system installed in waste pit 1. The pilot system proved to successfully increase the rate of the naturally occurring biological decomposition of the chemicals in the soil. A full-scale biotreatment system, currently in operation in all three pits, is expected to be the final soil remedy for this area.

STATUS

RRSE RATING:
High
CONTAMINANTS OF CONCERN:
Chlorinated Solvents, DNT
MEDIA OF CONCERN:
Soil, Groundwater
COMPLETED IRP PHASE:
PA/SI, RI/FS, 2 IRAs
CURRENT IRP PHASE:
RD, RA, RA(O)
FUTURE IRP PHASE:
RD, RA, RA(O)

Groundwater remediation started in 1990 with the construction of a pump and treat system called the Interim Remedial Measure (IRM) to capture contamination from the source (pits area). Groundwater capture along the southern boundary was begun in 1996, with the construction of the Modified Interim Remedial Measure (MIRM).

Investigations for other potential sources of solvents in the area was completed in 2002 and 2003. Results were negative.

A revised alternative FS was prepared to document the effectiveness of the remedial systems now in place. It proposed the SVE system, biotreatment system, groundwater pump and treat systems as the final remedy. This will be finalized after the system modivications are in place and proven.

PROPOSED PLAN

Continue to operate the biotreatment and pump and treat systems (IRM/MIRM). The biotreatment system is expected to operate until ~2006, and a RCRA cap as the final remedy.. The source area groundwater pump and treat system (IRM) is expected to operate until ~2011. The boundary groundwater pump and treat system (MIRM) is expected to operate until ~2012.

Groundwater monitoring is done as a part of an installation-wide program tracked at BAAP-012.

Install 4 new high capacity pumping wells in plume center for treatment at MIRM and modify pumping regime at the boundary.

Submit the revised alternate FS for regulatory approval.

BAAP-037
POWERHOUSE SOILS-OLD FUEL SPILLS

SITE DESCRIPTION

BAAP reported a fuel spill in 1991, south and adjacent to the Old Fuel Oil Tank site by the powerhouse. The spill was the result of a subsurface pipeline rupture from a 10,000 gallon fuel oil tank and was not associated with the old tank. This spill was immediately addressed by BAAP under the Wisconsin Underground Storage Tank regulations. During the course of the site investigation, it became clear that there was significant old fuel contamination in this area that is probably due to underground storage tanks that were previously located alongside the powerhouse. This was not included in the RI/FS. The oil in the groundwater and in the soil is not migrating. A product removal system for the groundwater and a bioventing system for the soil have been installed.

Free product was removed from groundwater in 1996. Soil bioventing pilot test started in the fall of 1997. An active soil bioventing system was upgraded and expanded to become fully operational in March 1999.

STATUS

RRSE RATING:
High Risk
CONTAMINANTS OF CONCERN:
Fuel Oil
MEDIA OF CONCERN:
Groundwater, Soil
COMPLETED IRP PHASE:
PA/SI, RI/FS, RD, RA
CURRENT IRP PHASE:
RIP w/RA(O), LTM
FUTURE IRP PHASE:
LTM

PROPOSED PLAN

Continue passive bioventing, long term monitoring. Prepare report for closure.

Groundwater monitoring is done as a site-wide program tracked under BAAP-012.

BAAP-040
GRUBER'S GROVE BAY

SITE DESCRIPTION

Gruber's Grove Bay received BAAP discharge waters during production. State sampling of sediment in Nov 98 showed elevated lead, mercury, zinc and ammonia. The results were confirmed in 1999 sampling.

The RI was completed in 2000. The selected remedy is dredging of sediments with disposal on the installation. The dredged materials are pumped into fabric tubes for dewatering. The water is treated, and sprayed on agricultural land on the installation. The dry, filled tubes were buried in place in an area north of the settling ponds. Dredging began in Jun 2001 and was completed in Nov 2001, with 88,000 cy removed. The geotubes were covered over in Sept 2002 (Phase I). Bay restoration activities (fish cribs, aquatic plants) were completed in Sept 2002. Final grading and seeding was completed in July 2003.

In early 2003, WDNR sampled the bay sediments and found some elevated levels of metals. Army investigated residual concentrations of metals in bay sediments in 2004.

STATUS

RRSE RATING:
High Risk
CONTAMINANTS OF CONCERN:
Mercury, Lead, Copper, Zinc
MEDIA OF CONCERN:
Sediments
COMPLETED IRP PHASE:
PA/SI, RI/FS, RD
CURRENT IRP PHASE:
RA
FUTURE IRP PHASE:
RC

PROPOSED PLAN

Army will complete preparation of the investigation report and submit to WDNR for approval (funded with prior year funds).

BAAP-042
BOX WASHOUT AREA

SITE DESCRIPTION

Located in the north central part of the installation. Buildings 1890-1 and 2890-2 were used to wash and repair propellant boxes for reuse. Each building has a 175 foot long drain that carried propellant residue and wash water to an open ditch in a field.

Sampling during the preliminary Remedial Investigation in the summer of 2004 found propellant residue containing DNTs and solvents on the soil surface in the ditches.

PROPOSED PLAN

In September 2004, a full Remedial Investigation to define the extent of the problem was conducted to perform the appropriate remedial action as soon as funding is received.

STATUS

RRSE RATING:
Low
CONTAMINANTS OF CONCERN:
DNT, Solvents
MEDIA OF CONCERN:
Soil
COMPLETED IRP PHASE:
PA/SI
CURRENT IRP PHASE:
RI
FUTURE IRP PHASE:
RD, RAC

BADGER ARMY AMMO PLANT

RESPONSE COMPLETE

SITES

BAAP-002
BALLISTICS POND

SITE DESCRIPTION

The Ballistics Pond (BP) is located in the northwestern corner of Badger. It is approximately 10 acres in area and is unlined. The pond received filter backwash water from the water treatment plant and is in close proximity to a rocket motor propellant testing site. It is believed that the pond bottom is plugged with flocculants and fine sediments from the water treatment facility. Quarterly groundwater monitoring was done from 1988 through 1998, when the WDNR discontinued all monitoring at this site, since no contaminants have been detected in that time.

Pond sediments were sampled for mercury in 2000 and 2001. Fish tissue samples were also analyzed. Two investigation reports were published in February 2001 and March 2002. Based on the results of the investigations, WDNR determined that no further action was required at this site.

STATUS

RRSE RATING:
High Risk
CONTAMINANTS OF CONCERN:
Mercury
MEDIA OF CONCERN:
Sediment
COMPLETED IRP PHASE:
PA/SI, RI
CURRENT IRP PHASE:
RC-2002

BAAP-003
OLEUM PLANT AND POND

SITE DESCRIPTION

The Oleum Plant and Pond are located near the northeastern boundary of Badger. The plant was used to make oleum, which is concentrated sulfuric acid containing sulfur trioxide. The Oleum Plant site includes a sulfur storage area at the western end of the plant. Traces of elemental sulfur are visible on the ground in the immediate vicinity of the plant. The Oleum Plant Pond is unlined. It received cooling water discharge from the plant and is assumed to have been used from the early 1940s to 1975 when the Oleum Plant was closed. Spills, leaks, and tank overflows at the Oleum Plant would be expected to contribute sulfate and nitrate to the groundwater, as well as metals (chromium, mercury, nickel) dissolved from the soil, pipes, and tanks. Elemental sulfur is not expected to contribute significant sulfate to the groundwater because the oxidation rate of large pieces of elemental sulfur is quite slow. Based on the Final RI Report dated April 1993, only long term monitoring is planned. The WDNR reduced monitoring requirements from quarterly to semi-annually in 1998 at this site.

The groundwater monitoring in this area is done as a part of an installation-wide program.

STATUS

RRSE RATING:
Low Risk
CONTAMINANTS OF CONCERN:
Sulfate, Nitrate, Chromium, Nickle
MEDIA OF CONCERN:
Soil, Groundwater, Sediment
COMPLETED IRP PHASE:
PA/SI, RI
CURRENT IRP PHASE:
RC-1995

BAAP-004
EXISTING LANDFILL #5

SITE DESCRIPTION

Landfill #5 and the Deterrent Burning Ground are located near each other in the northeastern part of Badger. The landfill was active from the time of BAAP's construction and was closed in the spring of 1989, in accordance with state regulations, with a two-foot layer of compacted clay then six inches of topsoil. This 15 acre landfill received all waste from administrative offices, security guard quarters, fire houses and limited operations in the laboratories. Waste insulation, which likely contained asbestos, was also reportedly disposed of here. No hazardous or propellant type waste was placed in this landfill. Based on the Final RI Report dated April 1993, only long term monitoring is planned. The local groundwater flow from this landfill cannot be differentiated from the local groundwater flow from the Deterrent Burning Ground.

STATUS

RRSE RATING:
Medium Risk
CONTAMINANTS OF CONCERN:
Sulfates, Nitrates
MEDIA OF CONCERN:
Soil, Groundwater
COMPLETED IRP PHASE:
PA/SI, RI, IRA
CURRENT IRP PHASE:
RC-1995

BAAP-005
NITROGLYCERINE POND

SITE DESCRIPTION

The Nitroglycerine Pond and the Rocket Paste Area are located near each other in the central portion of Badger. The Nitroglycerine Pond and Overflow Pond are small, unlined basins used between 1941 and 1997 to hold cooling waters, process wastewaters, and storm runoff generated in the nitroglycerine manufacturing area. It is possible that nitroglycerine and other contaminants, such as nitrite/nitrates, sulfates, sodium, calcium, and chlorides were in the discharges from this operation. A change in remedy to soil excavation and disposal in the Badger demolition landfill, and discharge of pond water to the ground surface after centrifuging to remove suspended soil particles was approved in 1998. Water and soil removal started in September and ended in November 1998. Final site closure work was completed in spring 1999.

STATUS

RRSE RATING:
High Risk
CONTAMINANTS OF CONCERN:
Heavy Metals, Nitrate
MEDIA OF CONCERN:
Soil, Groundwater, Surface Water
COMPLETED IRP PHASE:
PA/SI, RI/FS, RD, RA
CURRENT IRP PHASE:
RC-2001

BAAP-008
ROCKET PASTE AREA

SITE DESCRIPTION

In the Rocket Paste Area, a series of unlined ditches conveyed stormwater and process wastewater to a small, unlined pond and from there through a drainage swale south through the Rocket and Magazine areas to the Settling Ponds. Process wastewater consisted of makeup water used in mixing and formulating rocket paste, as well as cooling and washdown water. Rocket paste is a double-based plasticized propellant used to fuel solid fuel rockets and contains lead, nitroglycerine, and nitrocellulose.

A change in remedy from in-situ soil stabilization/ solidification to soil removal and disposal was approved, in conjunction with the Nitroglycerine Pond work. Soil removal from the ditches was completed in 1998.

STATUS

RRSE RATING:
High Risk
CONTAMINANTS OF CONCERN:
Explosives, Metals
MEDIA OF CONCERN:
Soil
COMPLETED IRP PHASE:
PA/SI, RI/FS, RD, RA
CURRENT IRP PHASE:
RC-2003

BAAP-010
NEW ACID AREA

SITE DESCRIPTION

The New Acid Area is located in the north central area of Badger. Nitric and sulfuric acid manufacturing and handling activities occurred here. A neutralization pond/seepage lagoon received releases from the acid area until 1981. The lagoon was closed with a clay cover in accordance with a WDNR approved plan in 1986.

Groundwater monitoring began in 1986 and continued until 1999, when the WDNR review indicated no problems with groundwater had been found and discontinued the monitoring requirement.

Maintenance of the lagoon soil cover will continue through at least 2004, as part of the site wide cap and cover maintenance program tracked at site BAAP-35.

STATUS

RRSE RATING:
Low Risk
CONTAMINANTS OF CONCERN:
Nitrate, Sulfate, Iron
MEDIA OF CONCERN:
Soil, Groundwater
COMPLETED IRP PHASE:
PA/SI, RI, IRA
CURRENT IRP PHASE:
LTM
FUTURE IRP PHASE:
RC

BAAP-011
OLD FUEL OIL TANK

SITE DESCRIPTION

The Old Fuel Oil Tank site is located south of the Old Acid Area and approximately 50 feet west of the main powerhouse. There is no documented evidence that details specific spills or releases of product from the Old Fuel Oil Tank. However, during excavation of a water line in 1989, fuel oil was encountered in subsurface soil near the remaining concrete tank foundation.

Based on the Final RI Report dated April 1993, no further action is planned specifically for the Old Fuel Oil Tank. Site remediation and cleanup of another fuel contaminated area in this location, tracked as Powerhouse Soil - Old Fuel Spill, BAAP-37, is in progress.

STATUS

RRSE RATING:
Low Risk
CONTAMINANTS OF CONCERN:
POL
MEDIA OF CONCERN:
Soil, Groundwater
COMPLETED IRP PHASE:
PA/SI, RI
CURRENT IRP PHASE:
RC-1995

BAAP-013
UNDERGROUND STORAGE TANKS

SITE DESCRIPTION

All underground storage tanks (USTs) have been removed from Badger. There were USTs at the garage (account 241-1) for diesel, gasoline, and waste oil. The waste oil tank on the south side of the garage was removed by 1989. The original diesel and gasoline tanks installed in the 1940s on the north side of the garage were replaced at least once prior to their removal in 1998, when the site was clean closed in accordance with Wisconsin regulations. This site was determined to require no further action after the initial evaluation in 1977 and was considered response complete in 1990.

No futher action is needed.

STATUS

RRSE RATING:
NE
CONTAMINANTS OF CONCERN:
Petroleum
MEDIA OF CONCERN:
Soil, Groundwater
COMPLETED IRP PHASE:
PA
CURRENT IRP PHASE:
RC-1990

BAAP-014
LANDFILL #6

SITE DESCRIPTION

Landfill 6 was constructed in 1987 to replace Landfill 5 (Existing Landfill). It was designed to receive all the installation's wastes starting in 1988. The design called for two construction phases, with cells 1 and 2 constructed in 1987 and cell 3 constructed in 1998. The liner is clay, with a leachate collection system. In 1994 it was reclassified as a Construction and Demolition (C&D) landfill in accordance with WDNR regulations, to avoid upgrading to the new municipal landfill standards that were then becoming effective. Since 1994, only construction, maintenance, and demolition debris have gone into this landfill, with all office and putrescible wastes going to an off-site landfill. In 1998, the WDNR approved deposition of the soils from the Nitroglycerine Pond, Rocket Paste, and East and West Rocket Ditches remediation in this landfill. Groundwater monitoring began in 1988 and will continue indefinitely. When closed, the site will have a RCRA cap that will require maintenance. In 2004, the landfill was expanded by construction of the first of five planned cells. This expansion should hold all demolition wastes from Badger

Because this is an active site, this site is not ER,A eligible.

STATUS

RRSE RATING:
NE
CONTAMINANTS OF CONCERN:
Nitrate, Sulfate, Metals, VOCs
MEDIA OF CONCERN:
Soil, Groundwater
COMPLETED IRP PHASE:
PA
CURRENT IRP PHASE:
RC (not eligible) - 1990

BAAP-015
SANITARY LANDFILL #3 (CLOSED)

SITE DESCRIPTION

This site has either been previously studied or is located near a site under investigation, thus no further action was required after the PA.

No further action is needed.

STATUS

RRSE RATING:
NE
CONTAMINANTS OF CONCERN:
None
MEDIA OF CONCERN:
None
COMPLETED IRP PHASE:
PA
CURRENT IRP PHASE:
RC - 1990

BAAP-016
POWERHOUSE #2

SITE DESCRIPTION

This site has either been previously studied or is located near a site under investigation, thus no further action was required after the PA.

No further action is needed.

STATUS

RRSE RATING:
NE
CONTAMINANTS OF CONCERN:
None
MEDIA OF CONCERN:
None
COMPLETED IRP PHASE:
PA
CURRENT IRP PHASE:
RC - 1990

BAAP-020
BALL POWDER PILOT PLANT

SITE DESCRIPTION

This site has either been previously studied or is located near a site under investigation, thus no further action was required after the PA.

No further action is needed.

STATUS

RRSE RATING:
NE
CONTAMINANTS OF CONCERN:
None
MEDIA OF CONCERN:
None
COMPLETED IRP PHASE:
PA
CURRENT IRP PHASE:
RC - 1990

BAAP-021
BALLISTICS AND TESTING AREA

SITE DESCRIPTION

This site has either been previously studied or is located near a site under investigation, thus no further action was required after the PA.

No further action is needed.

STATUS

RRSE RATING:
NE
CONTAMINANTS OF CONCERN:
None
MEDIA OF CONCERN:
None
COMPLETED IRP PHASE:
PA
CURRENT IRP PHASE:
RC - 1990

BAAP-022
BALL PROPELLANT PRODUCTION AREA

SITE DESCRIPTION

PA was started inJanuary of 1977 and completed in March 1977. No cleanup was determined necessary. The site was declared response complete in August 1990.

No further action is needed.

STATUS

RRSE RATING:
NE
CONTAMINANTS OF CONCERN:
Nitrate, Sulfate, Metals, VOCs
MEDIA OF CONCERN:
Groundwater, Soil
COMPLETED IRP PHASE:
PA
CURRENT IRP PHASE:
RC - 1990

BAAP-023
INGREDIENT WAREHOUSE

SITE DESCRIPTION

This site has either been previously studied or is located near a site under investigation, thus no further action was required after the PA.

No further action is needed.

STATUS

RRSE RATING:
NE
CONTAMINANTS OF CONCERN:
None
MEDIA OF CONCERN:
None
COMPLETED IRP PHASE:
PA
CURRENT IRP PHASE:
RC - 1990

BAAP-024
SMOKELESS POWDER PRODUCTION

SITE DESCRIPTION

PA was started inJanuary of 1977 and completed in March 1977. No cleanup was determined necessary. The site was declared response complete in August 1990.

No further action is needed.

STATUS

RRSE RATING:
Low Risk
CONTAMINANTS OF CONCERN:
Nitrate, Sulfate, Metals, VOCs
MEDIA OF CONCERN:
Groundwater, Soil
COMPLETED IRP PHASE:
PA
CURRENT IRP PHASE:
RC - 1990

BAAP-025
SALVAGE YARD

SITE DESCRIPTION

This site is still in use and is not eligilble for ER,A funding. It will be evaluated and remediated, if necessary, when no longer used.

No further action is needed.

STATUS

RRSE RATING:
NE
CONTAMINANTS OF CONCERN:
None
MEDIA OF CONCERN:
None
COMPLETED IRP PHASE:
PA
CURRENT IRP PHASE:
RC - 1990

BAAP-026
HAZARDOUS WASTE STORAGE AREA

SITE DESCRIPTION

This building was in use from 1988 thru 2004 as the hazardous waste storage facility licensed by the state. It is not eligible for ER,A funding. It will be evaluated and remediated, if necessary, when no longer used for this purpose.

No further action is needed. Since it was used recently, this site is not ER,A eligible.

STATUS

RRSE RATING:
NE
CONTAMINANTS OF CONCERN:
None
MEDIA OF CONCERN:
None
COMPLETED IRP PHASE:
PA
CURRENT IRP PHASE:
RC - 1991

BAAP-027
WASTE PROCESSOR

SITE DESCRIPTION

This site either has been previously studied or is located near a site under investigation, thus no further action was required after the PA.

No further action is needed.

STATUS

RRSE RATING:
NE
CONTAMINANTS OF CONCERN:
None
MEDIA OF CONCERN:
None
COMPLETED IRP PHASE:
PA
CURRENT IRP PHASE:
RC - 1990

BAAP-029
SOLVENT RECOVERY STILL AREA

SITE DESCRIPTION

This site either has been previously studied or is located near a site under investigation, thus no further action was required after the PA.

No further action is needed.

STATUS

RRSE RATING:
NE
CONTAMINANTS OF CONCERN:
None
MEDIA OF CONCERN:
None
COMPLETED IRP PHASE:
PA
CURRENT IRP PHASE:
RC - 1990

BAAP-030
LABORATORIES BLDG 201, 2556, 4034, 6682

SITE DESCRIPTION

The laboratory buildings are still in use and are not eligible for ER,A funding. They will be evaluated and remediated, if necessary, when no longer used.

No further action is needed.

STATUS

RRSE RATING:
NE
CONTAMINANTS OF CONCERN:
None
MEDIA OF CONCERN:
None
COMPLETED IRP PHASE:
PA
CURRENT IRP PHASE:
RC - 1990

BAAP-031
COAL YARD

SITE DESCRIPTION

This site either has been previously studied or is located near a site under investigation, thus no further action was required after the PA.

No further action is needed.

STATUS

RRSE RATING:
NE
CONTAMINANTS OF CONCERN:
None
MEDIA OF CONCERN:
None
COMPLETED IRP PHASE:
PA
CURRENT IRP PHASE:
RC - 1990

BAAP-032
ABOVE GROUND STORAGE TANKS

SITE DESCRIPTION

This site either has been previously studied or is located near a site under investigation, thus no further action was required after the PA.

No further action is needed.

STATUS

RRSE RATING:
NE
CONTAMINANTS OF CONCERN:
None
MEDIA OF CONCERN:
None
COMPLETED IRP PHASE:
PA
CURRENT IRP PHASE:
RC - 1990

BAAP-034
PROPELLANT BURNING GROUND-THERMAL TREATMENT UNIT/RACE TRACKS

SITE DESCRIPTION

The racetrack portion of the burning ground comprises ~6 acres and, until October 1994, consisted of 2 concrete burning pads located on the west side of an oval road. Past disposal practices in this area involved open burning of waste explosives, propellants, and explosive contaminated wastes on bare ground or in shallow steel pans. The pads were installed in 1983 and an elevated metal dish on the northern pad in 1984. Open burning in the dish was discontinued in November 1993. The 2 pads and the area surrounding them on the west side of the road were designated as a thermal treatment unit for explosive hazardous waste, and operated under an interim permit. The thermal treatment unit was closed in accordance with a WDNR approved plan in late 1995. The burning dish, concrete pads, and all surface soil contaminated with sufficient lead to qualify as characteristic hazardous waste have been removed and properly disposed.

STATUS

RRSE RATING:
High Risk
CONTAMINANTS OF CONCERN:
Heavy Metals
MEDIA OF CONCERN:
Groundwater, Soil
COMPLETED IRP PHASE:
PA/SI, RI/FS, RD, RA
CURRENT IRP PHASE:
RIP with LTM
FUTURE IRP PHASE:
RIP with LTM

The remaining soils in this area were covered with a soil cover. A thick naturally occurring clay layer underlying this area will naturally attenuate any leaching metals. Waste soil piles on the eastern side of the oval road were remediated in 1998 by removal and off-site disposal of the contaminated soil.

Long term maintenance of the soil cover is done as part of an installation-wide maintenance program tracked at BAAP035. Groundwater monitoring is is done as part of an installation-wide program tracked at BAAP-012.

BAAP-035
PROPELLANT BURNING GROUND-LANDFILL 1 & 1949 PIT

SITE DESCRIPTION

Adjacent to the waste pits on the west is the area designated as the 1949 pit. This area was apparently used for open burning, and constructed sometime after 1944, and was backfilled and closed by 1962. This area has some heavy metal contamination in the top ten feet of backfilled soil, but no other significant contaminants. A RCRA cap was installed over this area in 1998.

Approximately 400 feet east of the waste pits is a closed landfill (Landfill 1). This was reportedly used between 1944 and 1955 for solid waste and ash disposal. Heavy metals had been detected in the top 10 ft of soil at this site. A RCRA cap was installed over Landfill 1 in 1997. The 1949 Pit (separate location) was capped in fall 1998.

Long term maintenance of the caps will continue for both sites as part of an installation-wide maintenance program. All cap and cover maintenance costs are tracked at this site. Groundwater monitoring is done as part of the installation-wide program. Groundwater monitoring is tracked at BAAP-012.

STATUS

RRSE RATING:
High Risk
CONTAMINANTS OF CONCERN:
Heavy Metals
MEDIA OF CONCERN:
Soil
COMPLETED IRP PHASE:
PA/SI, RI/FS, RD, RA
CURRENT IRP PHASE:
RIP with LTM
FUTURE IRP PHASE:
RIP with LTM

BAAP-036
EAST & WEST ROCKET DITCHES

SITE DESCRIPTION

The East and West Rocket production areas are south of the Rocket Paste area, BAAP-008, and have much the same contaminants. A series of unlined ditches conveyed stormwater and process wastewater south to the Settling Ponds. Process wastewater consisted of makeup water used in mixing and formulating various rocket propellants, as well as cooling and washdown water. Contaminants included heavy metals, solvents, and DNT. A change in remedy from in-situ soil stabilization/solidification and soil cover to soil removal and disposal in the Badger demolition landfill was approved. Work began in September and was completed in November 1998.

No further action is expected at this site.

STATUS

RRSE RATING:
High Risk
CONTAMINANTS OF CONCERN:
Explosives, Heavy Metals, Solvents
MEDIA OF CONCERN:
Soil
COMPLETED IRP PHASE:
PA/SI, RI/FS, RD, RA
CURRENT IRP PHASE:
RC - 2003

BAAP-038
TRANSFORMER YARD-PCB IN SOIL

SITE DESCRIPTION

A PCB survey conducted by USAEHA in 1993 found one location, the main transformer yard south of the powerhouse, that required remediation. The highest level found (79ppm) appeared to be from leakage of transformers. Since these transformers were retrofilled with non-PCB oil in the early 1980s, the contamination is dated to between 1942 and 1979. Sampling and soil removal was completed in 1996. Response complete in December 1996. WDNR approval letter for the site closure was approved and dated January 22, 1997.

No further action is needed.

STATUS

RRSE RATING:
High Risk
CONTAMINANTS OF CONCERN:
PCBs
MEDIA OF CONCERN:
Soil
COMPLETED IRP PHASE:
PA , RI/FS, RA
CURRENT IRP PHASE:
RC - 1996

BAAP-039
OLEUM LANDFILL

SITE DESCRIPTION

This landfill site is an estimated 1.3 acre waste disposal site found in 1997 near the Oleum production facility in the northeast part of the installation. There is no formal documentation of this site, but it is believed to have been used during oleum production periods.

Borings done in May 1998 showed low levels of lead, probably from demolition disposal. Demolition debris, with asphalt, concrete, wood, and metal scrap was observed.

Awaiting WDNR comments on report submitted August 98.

No further action is expected.

STATUS

RRSE RATING:
Medium Risk
CONTAMINANTS OF CONCERN:
Lead
MEDIA OF CONCERN:
Soil
COMPLETED IRP PHASE:
PA/SI
CURRENT IRP PHASE:
RC - 1998

Schedule

The following is the schedule of IRP work completed to date and planned through completion of all restoration work. This schedule will change if the selected remedies for the Propellant Burning Ground waste pits, the Deterrent Burning Ground, and the Settling Pond/Spoils Disposal Area are changed.

PAST MILESTONES:

Installation Assessment	March	1981
Preliminary Assessment/Site Inspection	January	1988
Remedial Investigation	April	1993
Feasibility Study	August	1994
RCRA Permit modification	January	1996
Landfill 1 Capped	September	1997
1949 Pit Capped	September	1998
East & West Rocket Ditches remediated	November	1998
Oleum landfill investigation	August	1999
NG Pond/Rocket Paste remedial actions	August	1999
Oleum landfill remedial actions	December	1999
PBG/DBG/ Remedial Designs	December	2000
Gruber's Grove Dredging	November	2001
Deterrent Burning Ground Capped	September	2003
Follow-on Remedial Investigations		2003-2004

PROJECTED MILESTONES:

Remedial Actions Funded		2010
Projected completion date for IRP	December	2032+

Projected deletion from the National Priorities List (NPL) is not applicable to Badger AAP.

Schedule

The following sites currently require no further action under ER,A:

BAAP-002	Ballistics Pond
BAAP-003	Oleum Plant and Pond
BAAP-004	Existing Landfill (Landfill #5)
BAAP-005	Nitroglycerine Area
BAAP-008	Rocket Paste Area
BAAP-010	New Acid Area
BAAP-011	Old Fuel Tank
BAAP-013	Underground Storage Tanks (10)
BAAP-014	Landfill #6 (New 1989)
BAAP-015	Sanitary Landfill #3 (Closed)
BAAP-016	Powerhouse #2 (Inactive)
BAAP-020	Ball Powder Pilot Plant
BAAP-021	Ballistics and Testing Area
BAAP-022	Ball Propellant Production Area
BAAP-023	Ingredient Warehouse
BAAP-024	Smokeless Powder Production
BAAP-025	Salvage Yard
BAAP-026	Hazardous Waste Storage Area
BAAP-027	Waste Processor
BAAP-029	Solvent Recovery Still Area
BAAP-030	Laboratories Bldg 201, 2556, 4034, 6682
BAAP-031	Coal Yard
BAAP-032	Above Ground Storage Tanks
BAAP-036	East & West Rocket Area
BAAP-038	Transformer Yard, PCB in Soil
BAAP-039	Oleum Landfill

The following sites are Remedy in Place (RIP) with Long Term Monitoring (LTM) and/or Remedial Action Operations (RA(O)):

BAAP-006	Deterrent Burning Ground
BAAP-012	Off-Post GW Contamination
BAAP-034	Propellant Burning Ground-Thermal Treatment Unit/Ract Tracks
BAAP-035	Propellant Burning Ground Landfill / 1949 Pit
BAAP-037	Powerhouse Soils-Old Fuel Spills

REM/IRA/RA ASSESSMENT

Long Term Monitoring (LTM) began in 1988 at various sites on and off the installation. It has continued in accordance with WDNR requirements to the present.

New Acid Area (BAAP-010): The New Acid area neutralization/stabilization pond was closed in 1986 in accordance with a WDNR-approved plan. Groundwater monitoring in this area was done quarterly until June 1998, when the WDNR discontinued the groundwater monitoring requirement for this area.

Existing Landfill (BAAP-004): This area was capped in 1989 in accordance with WDNR requirements.

Propellant Burning Ground Contaminated Waste Pits (BAAP-33): Limited soil removal actions have been conducted at the contaminated waste area. Also an interim groundwater pump, treat, and discharge system was constructed and has operated continuously since May 1990. Modifications to this treatment plant were completed in March 1996. If it proves successful in capturing all the contaminated groundwater before it leaves the installation, it will be considered part of the final remedial action. A new source control well to extract groundwater from the pits area was installed in February 1998. The groundwater is treated at the IRM groundwater treatment system.

Propellant Burning Ground Thermal Treatment Unit (TTU)/Racetrack Area (BAAP-34): Soils at the TTU considered characteristic hazardous waste due to lead contamination were removed and sent off-site for treatment and disposal. A soil cover was placed over the area in the fall of 1995. Waste piles were removed for off-site treatment and disposal in 1998.

Off-post (BAAP-012): In the southern off-post area, the Army discovered that the chlorinated organic solvent plume had moved past the installation boundary and contaminated three residential wells. Two replacement wells were installed by the Army in December 1990, and the third in spring 1996. Prior to this, the Army provided bottled water to these residents. These well installations will be considered final remedial actions for the off-post area. The Off-Post Contingency Plan has been finalized. This describes actions to be taken if additional local groundwater drinking water supplies are threatened by contamination from BAAP related sources.

Transformer Yard - PCB in Soil (BAAP-38): Contaminated soils were removed and shipped off-site for disposal in December 1996.

Nitroglycerine Pond (BAAP-005)/Rocket Paste Area (BAAP-008): A diversion berm and drainage contouring project was completed in September 1996 to reduce inflow into the ponds, thereby reducing or eliminating surface water treatment costs.

Landfill 1/1949 Pit (BAAP-35): The landfill was capped in September 1997 as the final remedial action. Long-term monitoring and cap maintenance (LTO) are still required. The 1949 Pit was capped in September 1998 as the first phase of the final remedial action for this site. Phase two will involve extending the 1949 Pit cap over the adjacent PBG waste pits area. This will be done as the final remedial action in the waste pits area. Long-term monitoring and cap maintenance (LTO) are still required.

East and West Rocket Ditches (BAAP-36): Removal of contaminated soil and placement in an on-site landfill began in September 1998. Work was completed in November 1998 as the final remediation action for this site. Long term monitoring will be required.

Propellant Burning Ground waste pits (BAAP-33): A soil vapor extraction system operated from February 1998 to June 2000 successfully removing all readily accessible volatile organic compounds from the subsurface soils. In 2004 additional pumping wells were installed along the plume's axis to increase contaminant capture.

Deterrent Burning Ground (BAAP-006), an engineered cap and in-situ passive biotreatment system were placed in 2003. Water, air and nutrients are infiltrated below the cap to enhance biodegredation while the cap limits excess precipitation from flushing DNTs to groundwater.

REM/IRA/RA ASSESSMENT

Past REM/IRA/RA

Removal of readily accessible soil with disposal at an off-site incinerator was completed in 1999. A pilot scale biotreatment system successfully operated in 2000, accelerating in-situ remediation of dinitrotoluene.

Deterrent Burning Ground (BAAP-006): Removal of readily accessible soil with disposal at an off-site incinerator was completed in 2000.

Nitroglycerine Pond/Rocket Paste Area (BAAP-005, 008): Removal of metals contaminated soil with disposal in Badger's demolition landfill was completed in 1999.

Gruber's Grove Bay (BAAP-40): The mercury-containing sediments were removed from the Bay in 2001, with disposal in a lined site on Badger Army Ammunition Plant property.

Curent REM/IRA/RA

Powerhouse Soil - Old Fuel Spills (BAAP-37): A removal system for oil on the groundwater was installed in 1997. A bioventing system was designed in fall 1997, and pilot operations were completed successfully. Modifications for improving the system were completed in 1999. Is is expected to operate for three years be the final remedy.

Propellant Burning Ground (BAAP-33); A full scale in-situ biotreatment system was installed and is expected to be shut down in 2005 as a completed remedy. Additional pumping wells are being installed in the center of the plume to speed up plume capture.

Old Acid Area)BAAP-009) A temporary soil cover is being installed to prevent fugitive dust emissions.

Future REM/IRA/RA

RA at BAAP-001, 006, 009, 033, 040

COMMUNITY INVOLVEMENT

At each phase of the environmental restoration process, public information meetings have been held at BAAP to keep the community informed of the progress of the cleanup program. In January 1993 the installation began publishing an environmental newsletter to keep the employees, local citizens, and politicians updated on the environmental work underway.

In 1993 the Badger Environmental Board of Advisors (BEBA) was formed to provide a venue for citizens to participate in the cleanup program at the installation. The first BEBA meeting was held in September 1993 and the group has met regularly since then.

The BEBA was formed before the guidelines for Army Restoration Advisory Boards (RAB) were finalized. The BEBA had functioned as the Badger RAB until November 2000, when the BEBA refused the Army's request for the BEBA to comply with current RAB guidance.

The BEBA members were able to transition to an expanded, regulatory-compliant RAB, which started meeting in January 2001 and continues to meet and advise the Army on restoration issues.

In 2002, the Badger Intergovernmental Group (BIG) was formed to work toward the disposal of Badger Army Ammuntion Plant real estate. This group is another opportunity for the community to provide input on the actions being taken to ready the installation for ownership.